NAVISTAR, INC
DEFECT INFORMATION REPORT

TO: Manager
Engine Programs Group (6405J)
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

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DATE : March 04, 2015

The following Defect Information Report is submitted in accordance with 40 CFR §1068.501.

[40 CFR §1068.501(d)(1)] MANUFACTURER CONTACT INFORMATION

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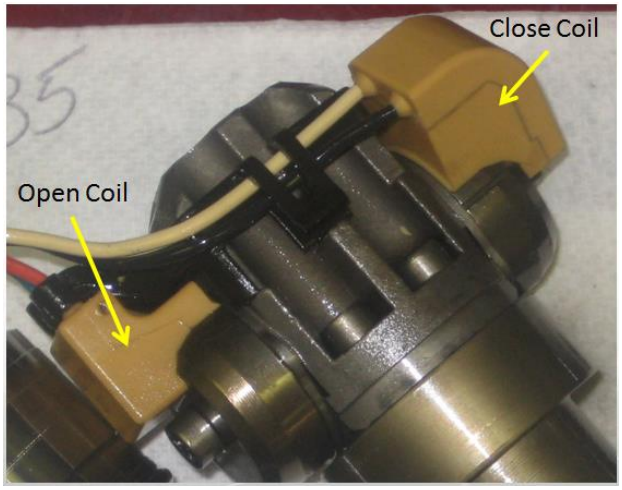
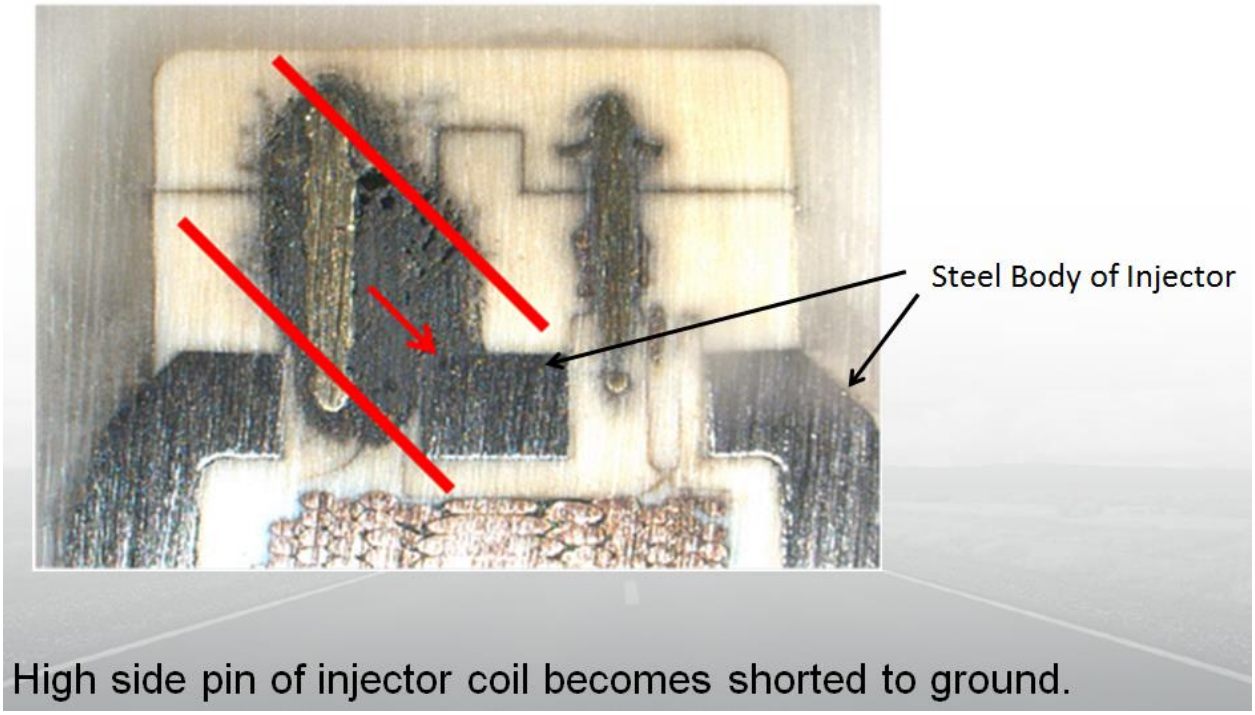
[40 CFR §1068.501(d)(2)] DEFECT DESCRIPTION

This report addresses a design defect in the electronic / hydraulic unit injector. The injector contains an "open" coil and "close" coil as seen below. The coils move a spool valve back and forth, which admits high pressure oil to an intensifier piston, causing a fuel injection event.

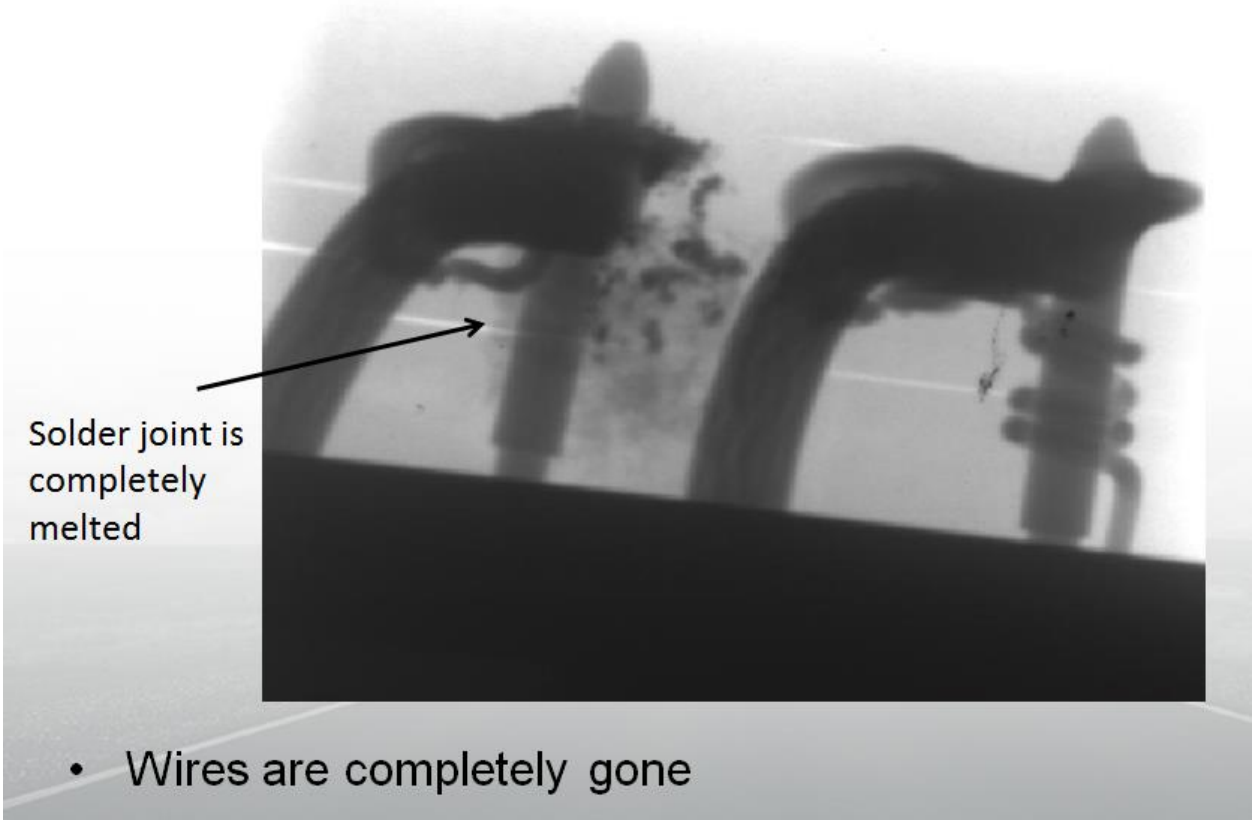


Both coils have a "high side" and "low side" solder connection which attaches the injector wiring to the coils.
The "high side" solder joint in the close coil will occasionally increase in resistance. This may be due to manufacturing issues or contamination from engine oil. Once the resistance increases, localized Joule heating causes melted solder and copper wire to create a short circuit to the injector body (ground). This is commonly referred to as a "HiPot" failure. Due to the control system design, a HiPot failure will disable 3 injectors and set appropriate diagnostic codes.

Below is a sectioned close coil illustrating a typical HiPot failure. The charred area between the red lines is where the solder has shorted the terminal to the injector body.



Below is an x-ray of another failed close coil.



This failure mode increased from less than 1% of injector failures to ~ 45% when a design change to the fuel pressure/oil pressure intensification ratio was made. The ratio was increased from 7.6 / 1 to 10 / 1. This change required additional injector modifications to allow for higher oil demands including a longer close coil energize duration. The duration was increased from 1.0 mS to 1.5 mS for all engine operation even though it was only required for high fuel flow and / or extreme cold or hot oil operation.
A software modification has been designed and calibrated which will reduce the close coil on time to 1.2 mS during engine operation when 1.5 mS is not required while automatically returning to 1.5 mS when required.

[40 CFR §1068.501(d)(3)] DESCRIPTION OF VEHICLES/ENGINES AFFECTED

Engine Family Name	Model Year	Engine Model	Engine Plant Ship Dates
ANVXH04660GA	2010	MaxxForce DT	2010
BNVXH04660GA	2011	MaxxForce DT	2011
BNVXH04660GC	2011	MaxxForce DT	2011
BNVXH05700GA	2011	MaxxForce 9/10	2011
CNVXH04660GA	2012	MaxxForce DT	2012
CNVXH04660GB	2012	MaxxForce DT	2012
CNVXH05700GA	2012	MaxxForce 9/10	2012
CNVXH05700GC	2012	MaxxForce 9/10	2012
DNVXH04660GA	2013	MaxxForce DT	2013
DNVXH04660GB	2013	MaxxForce DT	2013
DNVXH05700GA	2013	MaxxForce 9/10	2013
ENVXH05700GA	2014	MaxxForce 9/10	2014
ENVXH05700SA	2014	N 9/10	2014
FNVXH05700GA	2015	MaxxForce 9/10	2015
FNVXH05700SA	2015	N 9/10	2015

[40 CFR §1068.501(d)(4)] NUMBER OF ENGINES ESTIMATED TO HAVE DEFECT

Failure rates are based on injector failures at 40 months in service with HiPot failures being 45% of injector failures and one failure per engine. Model years 2013, 2014, and 2015 expected to match 2012.

Engine Family Name	Number of Engines Affected	Total Production	Percent of Family Affected
ANVXH04660GA	950	12,947	7.3%
BNVXH04660GA	1,480	12,002	12.3%
BNVXH04660GC	2,012	16,317	12.3%
BNVXH05700GA	910	7,382	12.3%
CNVXH04660GA	863	9,831	8.8%
CNVXH04660GB	1,369	15,608	8.8%
CNVXH05700GA	328	3,735	8.8%
CNVXH05700GC	25	285	8.8%
DNVXH04660GA	554	6,300	8.8%
DNVXH04660GB	799	9,084	8.8%
DNVXH05700GA	251	2,847	8.8%
ENVXH05700GA	1000	11,358	8.8%
FNVXH05700GA	15	172	8.8%

[40 CFR §1068.501(d)(5)] EVALUATION OF EMISSIONS IMPACT

The emissions impact of a HiPot failure is unknown.
If the injector spool valve fails to close, that one injection event will receive the maximum fuel quantity available but the next commanded injection event will not occur as there will be no fuel to inject. The intensifier piston would have never returned to it's original position. The ECM will store a trouble code and light a lamp. Due to shared circuitry, one failed injector causes one of two high side drivers to turn off deactivating a total of three injectors. Engine operation on three of six cylinders will be unacceptable.

[40 CFR §1068.501 (d)(6)] ANTICIPATED MANUFACTURER FOLLOW-UP

Navistar intends to perform a voluntary emissions recall to reflash ECM's with calibrations containing updated close coil on time software. Due to the number of engines the recall will be performed in stages.

SIGNED: Dave Polivka
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